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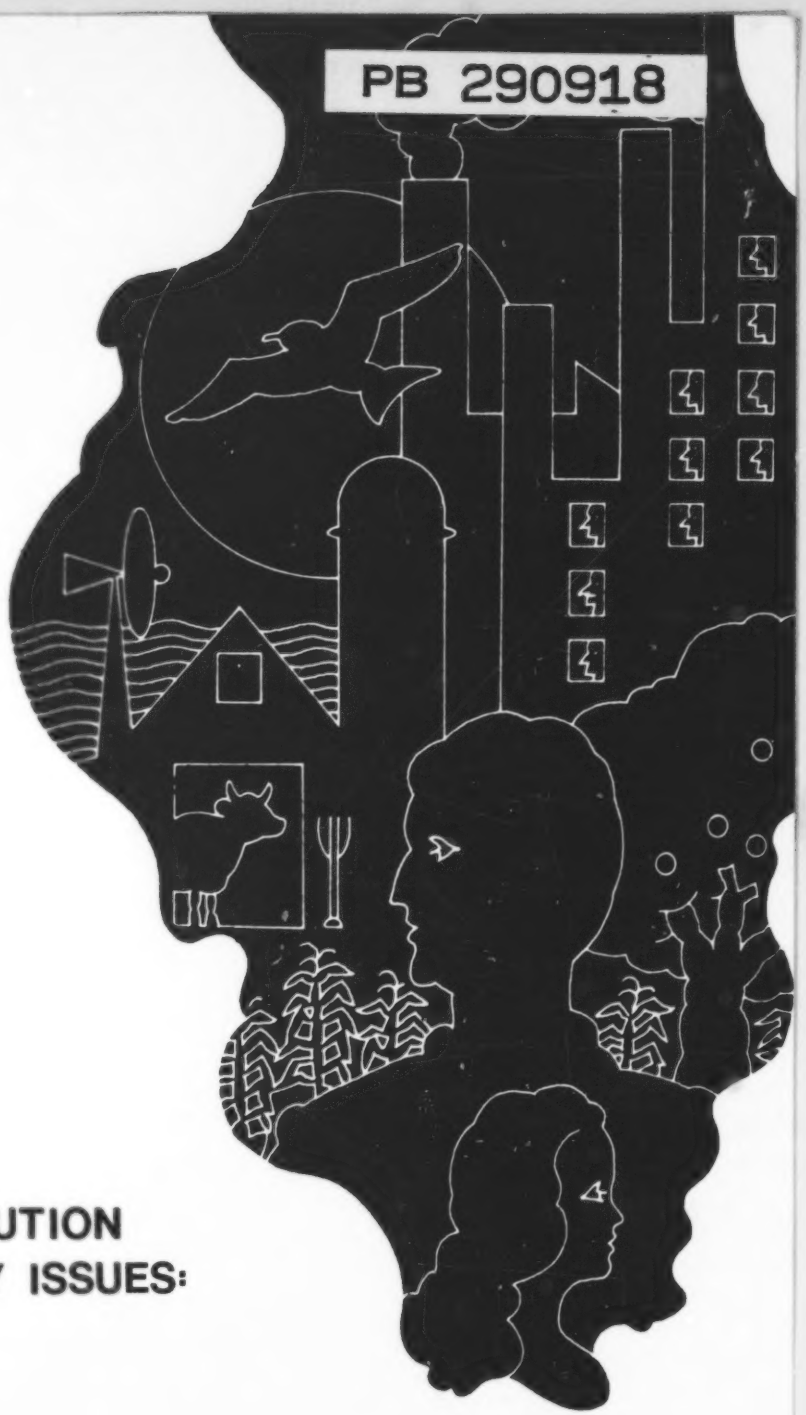

COAL MINE WATER POLLUTION LEGAL AND REGULATORY ISSUES: A SURVEY

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The Illinois Mine Related Pollution Task Force is a joint activity of the Illinois Coal Association and the Illinois Environmental Protection Agency. The Task Force's activities are coordinated by the Illinois Institute of Natural Resources.

The Task Force decided that the achievement of their goal would be furthered by surveying rules and regulations governing mine related water pollution in other bituminous coal producing states. The basic problem which the Task Force is addressing in the survey is the extent to which other major bituminous coal producing states are experiencing differences between their effluent standards and their water quality standards and what, if anything, is being done to resolve differences where they occur. The states selected for study in this report are Colorado, Indiana, Kentucky, Ohio, Pennsylvania, West Virginia and Wyoming.

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COAL MINE WATER POLLUTION

LEGAL AND REGULATORY ISSUES:

A SURVEY

by

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SUMMARY

West Virginia and Kentucky produce more coal than any of the other states studied (see Appendix B for a comparison). In 1975, West Virginia produced 109,283,000 tons of coal; Kentucky produced 143,614,000. The average daily employment in coal mining activities in 1975 amounted to 54,210 in West Virginia; 36,070 in Kentucky. The value of coal production in West Virginia in 1972 was $1,275.8 million; in Kentucky, $824.7 million. [1] Coal mining and satellite industries which either service the coal industry or depend upon it for raw materials are major segments of the West Virginia and Kentucky economies. As a result of coal's economic importance, water pollution control regulations have evolved which are less stringent in these states than in other states surveyed where coal mining is of less relative economic importance.

Both Kentucky and West Virginia subscribe to basic federal effluent limitations (Table 1). The Kentucky Bureau of Environmental Protection is prohibited by state law from imposing effluent limitations which are more stringent than federal limitations.

Neither Kentucky or West Virginia has water quality standards for sulphates, chlorides or total dissolved solids as stringent as those of Illinois or any of the other states included in this survey (Table 2). West Virginia's chloride standard of 100 mg/l (Table 2) was promulgated primarily to prevent pollution from brine discharges from gas well drilling but the state has found the standard difficult to enforce because of the difficulty in tracing the sources of such spills. Kentucky has a total dissolved solids water quality standard which merely states that total dissolved solids shall not be changed to the extent that aquatic life will be damaged.

Three states (Colorado, Indiana and Ohio) have adopted water quality standards for sulphates, chlorides and total dissolved solids when the receiving water is used for a public

water supply. Colorado and Indiana may impose more stringent effluent standards in order to maintain water quality standards while Ohio EPA is prohibited by state law from so doing. The water quality standards for chlorides, sulphates and total dissolved solids for public water supplies in Colorado, Ohio and Indiana are the same as those which apply in Illinois (Table 2); namely, chlorides - 250 mg/l, sulphates - 250 mg/l, total dissolved solids - 500 mg/l. In addition, Colorado recently adopted a policy of "no salt return wherever practicable" to waters which are part of the Colorado River drainage. It is not known what effect the policy will have on coal mining; however, since many coal mines in Colorado have zero discharge, the impact is expected to be felt primarily by non-point dischargers.

Indiana and Ohio have chloride and sulphate standards of 250 mg/l (Table 2) for waters classified as public water supplies; however, because most coal mines are located in rural areas where residents depend on wells for drinking water, neither state has experienced a conflict to date and neither state has found it necessary to impose expensive technological devices to remove total dissolved solids from mine wastes. Indiana also has a total dissolved solids standard of 750 mg/l as a monthly average or 1000 mg/l at any one time for receiving waters which are used for industrial water supplies. Geographic segregation of major industries and coal mines in Indiana have prevented conflicts from occurring so far.

Wyoming acknowledges that salinity (total dissolved solids) is an important water quality criteria, but has not set numerical limitations. The state does, however, have effluent standards for chlorides (2000 mg/l), sulphates (3000 mg/l) and total dissolved solids (5000 mg/l). These effluent standards were promulgated to prevent brine discharges from oil and gas well drilling.

Pennsylvania has adopted the most stringent water quality standards of all the states surveyed especially for chlorides,

sulphates and total dissolved solids (Table 2). The Pennsylvania Department of Environmental Resources has the authority to impose more stringent effluent standards if necessary to protect water quality. Pennsylvania is in the process of studying their water quality standards which affect the coal industry; the Pennsylvania Department of Environmental Resources estimates that about 75 percent of all coal mines operating in the state are out of compliance with the state's water quality standards. The agency's uncodified policy has been to disregard the violations; however, they are continuing to seek strategies to deal with the problem and have been hesitant to require coal mine operators to install expensive technological devices which would bring them into compliance. There is concern in Pennsylvania (and other states) that a situation may arise where an industrial (process) water user is faced with costly treatment of water with high total dissolved solids values and decides to seek relief from his economic burden through the courts; that is, the industrial user would sue the agency to enforce its regulations. In Pennsylvania there is also concern about the poor quality of the water which enters Pennsylvania from West Virginia, a state which has less stringent water quality standards.

Colorado and Wyoming coal mines are "alkaline". Alkaline mine discharges have low concentrations of manganese, requires no neutralization, is usually of good quality but requires sedimentation to reduce concentrations of suspended solids.

Many coal mines in Illinois, Indiana, Kentucky, Ohio, Pennsylvania and West Virginia are "acid" or ferruginous. These mines employ standard technologies for treatment of mine wastes including flow equalization, neutralization with an alkali to remove manganese, iron and other soluble metals, aeration for oxidation of iron, and settling basins and mechanical clarifiers for removal of suspended solids. The most intractable source of water pollution in states having acid mines is abandoned mine drainage.

Some highlights of the findings of this survey are:

- Illinois has the same water quality standards for chlorides and sulphates for waters used as public water supplies (250 mg/l respectively) as three other states (Colorado, Indiana, and Ohio).
- Pennsylvania's water quality standards for chlorides (150 mg/l), sulphates (250 mg/l) and total dissolved solids (500 mg/l monthly, 750 mg/l at any one time) are more stringent than Illinois' (1000 mg/l).
- No state has sought to impose expensive treatment technology such as reverse osmosis upon coal mine operators but have resorted to the following strategies to deal with the issue:
  a) Mine discharges may be diverted to an alternate watershed. (Ohio)
  b) Violations of water quality standards are ignored. (Pennsylvania)
  c) Water quality standards which would place a burden on coal mine operators are not promulgated in the first place or are easily removed if compliance is economically or technically infeasible. (West Virginia)
  d) Streams which only exist when it rains but which may receive discharges from coal mining operations are excluded from water quality standards. (Kentucky)
  e) Streams or stream segments which have been severely polluted by coal mine drainage through time are exempt from water quality standards. (Ohio)
- Four states (Indiana, Kentucky, Pennsylvania and Wyoming have advisory groups; however, the purpose of each group and representation of interests is in general broader than the Mine Related Pollution Task Force.

Table 1

Comparison of Effluent Standards
for Bituminous Coal mines for Selected States
and the Federal Standard

State	Total Suspended Solids		Total Iron		Manganese		pH	Comments
	30 Day Average mg/l	Daily Max	30 Day Average mg/l	Daily Max	30 Day Average mg/l	Daily Max	Range	
U. S. EPA	35.0	70.0	3.5	7.0	2.0	4.0	6.0-9.0	Manganese standard does not apply for alkaline mines
Colorado	35.0	70.0	3.5	7.0	-	-	6.0-9.0	More stringent effluent limitations may be imposed to maintain water quality
Illinois	shall not exceed	50.0	shall not exceed	7.0	2.0	4.0	5.0-10.0	Total Lead: 1.0, Nitrogen: 5.0; Total Zinc: 5.0 Total Fluoride: 8.0; total acid must not exceed total alkalinity. No effluent may cause violation of any applicable water quality standard.
Indiana	35.0	70.0	3.5	7.0	2.0	4.0	6.0-9.0	More stringent effluent limitations may be imposed to maintain water quality.
Kentucky	35.0	70.0	3.5	7.0	2.0	4.0	6.0-9.0	More stringent effluent limitations may not be imposed to maintain water quality.
Ohio	35.0	70.0	3.5	7.0	2.0	4.0	6.0-9.0	More stringent effluent limitations may not be imposed to maintain water quality.
Pennsylvania	35.0	70.0	3.5	7.0	2.0	4.0	6.0-9.0	More stringent effluent limitations may be imposed to maintain water quality. Exceptions may be granted if water quality will not be degraded.
West Virginia	35.0	70.0	3.5	7.0	2.0	4.0	6.0-9.0	More stringent effluent limitations may be imposed to maintain water quality.
Wyoming	35.0	70.0	3.5	7.0	-	-	6.5-8.5	Chlorides: 2000 mg/l; Sulphates: 3000 mg/l; Total dissolved solids: 5000 mg/l. More stringent effluent limitations may be imposed to maintain water quality.

Table 2

Summary of Water Quality Standards
Pertinent to Bituminous Coal Mines for Selected States

State	pH Range	Iron mg/l	Manganese mg/l	Chlorides mg/l	Sulphates mg/l	Total Dissolved Solids mg/l	Other
Colorado	6.5-9.0 5.0-9.0*	1.0 Cold/Warm Water Biota 0.3* (sol)	1.0 Cold/Warm Water Biota 0.002*	250*	250*	No salt return policy	
Illinois	6.5-9.0	1.0 0.3*	1.0 0.05*	500 250*	500 250*	1000 500*	
Indiana	6.0-9.0			250*	250*	750** mthly avg 1000** at any time	
Kentucky	6.0-9.0	1.0 3.5 at low flow	.2 (irrigation water)			Shall not be changed to the extent that aquatic life will be damaged.	
Ohio	6.0-9.0	1.0 0.3* (sol)	0.050*	250*	250*	May exceed one but not both of 1500 mg/l or 150 mg/l or 500 mg/l*& 150 mg/l*	Mine drainage segments of certain streams exempt from TDS standard
Pennsylvania	6.0-9.0	1.5 total 0.3 (sol)	1.0	150	250	500 mthly avg 750 at any time	
West Virginia	6.0-8.5			100			Acidity shall not exceed alkalinity
Wyoming	6.5-9.0					Acknowledged	

* Public Water Supply ** Industrial Water Supply

INTRODUCTION

Discharges from Illinois coal mines are not permitted to exceed effluent criteria enumerated in Chapter 4, Rule 606 of the Illinois Pollution Control Board's Regulations (Table 1). In addition, Rule 605 states that no effluent may cause violation of any applicable water quality standard enumerated in Chapter 3 of the Pollution Control Board's Regulations (Table 2).

Water from coal mining activities is typically discharged into small streams which have widely varying flow rates. During periods of low flow rates, the mine effluent may cause violations of water quality standards. The imposition of more stringent effluent standards which may necessitate installation of expensive treatment devices to protect water quality may create economic hardship within the coal mining industry.

The Illinois Mine Related Pollution Task Force is a joint activity of the Illinois Coal Association and the Illinois Environmental Protection Agency. The Task Force's activities are coordinated by the Illinois Institute of Natural Resources. The goal of the Task Force as stated in its Charter is "to consider and recommend ... appropriate revisions to Rule 605 of Chapter IV of the Pollution Control Board regulations ... if it is determined that general compliance with this rule is technically or economically infeasible for the Illinois coal industry." Rule 605 states that no effluent may cause violation of any applicable water quality standard either alone or in combination with other sources.

The Task Force decided that the achievement of their goal would be furthered by surveying rules and regulations governing mine related water pollution in other bituminous coal producing states. The basic problem which the Task Force is addressing in the survey is the extent to which other major bituminous coal producing states are experiencing differences between their effluent standards and their water quality

standards and what, if anything, is being done to resolve differences where they occur. The states selected for study in this report are Colorado, Indiana, Kentucky, Ohio, Pennsylvania, West Virginia and Wyoming.

METHODOLOGY

Regional offices of the U. S. Environmental Protection Agency were contacted to learn which state agencies were responsible for water quality regulations in the selected states, to develop appropriate contacts within each of those agencies and to obtain information about federal effluent standards.

Telephone contact was made with each state's agency or agencies responsible for promulgation and enforcement of water quality rules and regulations. The state officials were asked a standard set of predeveloped questions in order to eliminate bias. Probing was used to develop information in greater detail.

In each case, verification of the information was obtained by contacting other state officials, industry representatives and public interest groups.

Written materials received from each state were analyzed and compared with information received by telephone. Questions were raised with appropriate state officials where necessary to clarify specific points about each state's water pollution control laws.

COLORADO

Twenty-eight percent of the State of Colorado is underlain with coal bearing rocks. Coal is mined on both the eastern and western slopes of the Continental Divide. In 1975, Colorado produced 8,219,000 tons of coal.[2/] The state had demonstrated coal reserves of 14,869.2 million tons in the same year (Appendix C). Unlike eastern coal mining states, Colorado has few coal mines (33 in 1975). Production is almost evenly divided between strip mines and deep mines (Table CO-1). The industry's average daily employment was only 1,840 in 1975 (Appendix B). More than half of Colorado's total production came from seven mines which produced in excess of 500,000 tons annually (Table CO-2).

Table CO-1

Number and Production of Bituminous Coal Mines in 1975 (thousands of tons)

	No. of Mines	Quantity
Underground	18	3,446
Strip	15	4,773
Total	33	8,219

Adapted from U. S. Bureau of Mines, Minerals Handbook, 1975

Table CO-2

Size of Mines 1975

	No. of Mines	Quantity
500,000 tons and over	7	5,315
200,000 - 499,999	6	1,855
100,000 - 199,999	5	621
50,000 - 99,999	4	294
49,999 and under	11	134

Although there is considerable variation among coal seams and among coals extracted from different parts of the

state, typical Colorado coal can be described as follows: moisture content ranges from 1.0 - 20.0 percent (12 % is the average value); ash varies from 2.1 to 15.0 percent (6.0 % is the average value). Colorado's coal has a low sulphur content (0.2 - 1.1 %). Ninety-nine percent of Colorado's coal contains less than 1.0 percent sulphur; more than 50 percent contains about 0.7 percent sulphur. The average heat value for Colorado coal is 11,370 Btu per pound. 3/

Colorado was authorized to administer the National Pollution Discharge Elimination System (NPDES) in 1974. Legislative authority for the state's water quality control program is found at CRS (1973) 25-8-101 et seq. as amended.

The Act created a Water Quality Control Commission as a division of the Department of Health. The Commission is the designated water pollution control agency for purposes of the federal act. The Commission is empowered to establish policy, promulgate control regulations, set water quality standards and classify state waters. There are eleven members on the Commission, seven of which are public members appointed by the governor from each of five Congressional districts plus two at large members. The other four Commission members are: Director, Department of Natural Resources; Representative of the Water Conservation Board; Representative of the Wildlife Commission; Representative of the Board of Health. The Chairman is appointed by the governor. No members of the Water Quality Control Commission specifically represent coal mining interests.

The Division of Administration of the Department of Health is charged with administering water quality control programs adopted by the Water Quality Control Commission.

Effluent Limitations

Colorado has no specific discharge limitations for the discharge of sulphates, chlorides, manganese or total dissolved

solids. The mining industry is generally subject only to effluent guidelines established by the U. S. Environmental Protection Agency (Table 1); however, the state reserves the right to augment the effluent limitations in order to maintain water quality or to bring a receiving water up to its prescribed water quality standards. More stringent discharge limitations may be applied to discharges to otherwise dry stream beds. Imposition of more stringent effluent limitations are administered through the permit system.

Colorado is a member of the Colorado River Basin Salinity Control Forum. Approximately 50 percent of the state (west of the Continental Divide) is subject to the Colorado River Salinity standards. (The eastern slope is not subject to the same standards.) The salinity standards include numeric criteria and a plan of implementation providing for a flow weighted average annual numeric criteria for three stations in the lower mainstem of the Colorado River (below Hoover Dam, 723 mg/l; below Parker Dam, 747 mg/l; below Imperial Dam, 879 mg/l). One component of the implementation plan is placing effluent limitations on industrial and municipal discharges through the NPDES permit program.

On March 7, 1978, the Water Quality Control Commission adopted standards which state that "the objective for discharges shall be a no salt return policy whenever practicable." The Department of Health may permit the discharge of salt upon satisfactory demonstration by the permittee that it is not practicable to prevent the discharge of all salt. Satisfaction of the "whenever practicable" exception is the responsibility of the permittee. Evaluation will be made on a case by case basis.

Water Quality Standards

The water quality standards include general standards for all state waters, state water classifications and numeric criteria for each classification of water. New standards went into effect

on July 20, 1978; new stream classifications will not be completed until sometime in 1979. Both criteria and standards apply to most streams. A temporary modification of a standard may be granted if a standard is not being met but is necessary to achieve the classified use. There is a provision for mixing zones to be determined on a case by case basis.

Basic Standards

All waters of the state are subject to basic standards. Discharges of substances regulated by permits which are within permit limitations shall not be a basis for enforcement proceedings under the basic standards. The basic standard which apply to coal mining is:

Salinity: The Commission recognizes that excessive salinity and suspended solids can be detrimental to water use classifications and had adopted standards for the Colorado River Basin (previously discussed) but has not adopted statewide standards for salinity or suspended solids.

Water Quality Criteria pertinent to coal mining are:

pH - 6.5 - 9.0 except for public water supply where the standard is 5.0 - 9.0.

Total dissolved solids - no numerical value indicated. A numerical value may be required for certain cases; however, at present there is insufficient data for setting a general criterion.

Iron - 1.0 mg/l for Cold and Warm Water Biota
0.3 mg/l (soluble) for Water Supplies

Manganese - 1.0 mg/l for Cold and Warm Water Biota
0.002 mg/l for Water Supplies

Chlorides - 250 mg/l for Water Supplies

Sulphates - 250 mg/l for Water Supplies

The above values are criteria; however, if the Division has information which it believes establishes the appropriate limitation for protecting the designated uses and those values

are different from the established criteria, the Division may apply the different values.

Colorado has not experienced any differences between its effluent standards and its water quality criteria with respect to coal mining operations. Because the state is semi-arid, little dewatering from coal mines occurs. Manganese discharges are not troublesome because Colorado coal mines are alkaline. Many mines discharge no water. Mine runoff frequently drains into the pit and can be used for dust control on roads.

Where analysis shows discharges to be high in dissolved solids and sulphates, flow limitations based on current pumping rates may be raquired to prevent increased salinity loading to the receiving waters. Retention ponds may be required and these are specified in the NPDES permit.

INDIANA

There are coal deposits present in twenty-five counties in southwestern Indiana (an area of approximately 6,500 square miles). 1975 Indiana coal production amounted to 25,124,000 tons. 1/ Demonstrated coal reserves in the same year were 10,622.6 million tons. The average daily employment in Indiana coal mines during 1975 was 3,040 (Appendix B).

Almost all of Indiana's coal production came from 13 large strip mines during 1975 (Table IN-1).

Table IN-1

Size of Mines
1975

	No. of Mines	Quantity
500,000 tons and over	13	22,176
200,000 - 499,999	1	814
100,000 - 199,999	5	751
50,000 - 99,999	12	857
49,999 and under	31	527

Adapted from U. S. Bureau of Mines, Minerals Handbook, 1975

At present, the state has only two active deep mines with a third expected to begin operation early next year. (Table IN-2).

Table IN-2

Number and Production of Bituminous Coal Mines in 1975
(thousands of tons)

	No. of Mines	Quantity
Underground	2	188
Strip	60	24,935
Total	62	25,124

Although there is considerable variation among coal seams and among coals extracted from different locations in the state, typical Indiana coal may be described as follows: all coals in Indiana are ranked as high-volatile bituminous coal. Moisture content ranges from 10.0 - 15.5 percent, ash varies between 6.3 and 12.2 percent. Sulphur content ranges from 1.1 to 4.0 percent and heat values range from 10,900 Btu/lb to 11,590 Btu/lb. 3/

Indiana's water quality standards are established by the Indiana Stream Pollution Control Board. Legislative authority for the state's water quality control program is found at IC1971, 13-1-3 as amended. The Indiana Stream Pollution Control Board consists of seven members. The Secretary of the Indiana Board of Health, Director of the Department of Natural Resources and the Lt. Governor are ex-officio members of the Board; the four remaining members are appointed by the governor.

The Stream Pollution Control Board also has the power to investigate alleged violations of water pollution regulations and to bring appropriate action to enforce laws and orders relating to the pollution of the waters of the state. The Stream Pollution Control Board is designated as the water pollution control agency for Indiana for purposes of PL 92-500.

Effluent Standards

Effluent standards are the same as the federal standards (Table 1). The state has the authority to impose more stringent effluent standards through the permit system if necessary to protect water quality standards.

Water Quality Standards

Indiana has adopted a Total dissolved solids standard for waters which are used as potable water supplies or industrial water supplies. The standards are:

Potable Water Supply:

Dissolved Solids - The concentrations of either chlorides or sulphates shall not exceed 250 mg/l other than due to naturally occurring sources.

Industrial Water Supply:

Dissolved Solids - The concentrations shall not exceed 750 mg/l as a monthly average nor exceed 1,000 mg/l at any time. Values of specific conductance of 1200 and 1600 micro-homos/cm (at 25^{o} cm) shall be considered

equivalent to dissolved solids concentrations of 750 mg/l and 1000 mg/l.

The standards outlined above are measured at the point at which water is withdrawn for use.

Indiana's water quality standards provide for mizing zones to be determined on a case by case basis. Criteria for determining the size of a mixing zone are based on the dilution ratio, characteristics of the stream and the effluent, anticipated effect of the discharge on the quality of the receiving body of water, uses of the receiving body of water, possible synergistic effects of overlapping or adjacent mixing zones.

Water quality criteria apply at all times when the flow is greater than the average minimum seven consecutive day low flow which occurs once in ten years.

Indiana was approved to issue NPDES permits on January 1, 1975. At that time, water quality standards for iron were eliminated. The Stream Pollution Control Board believed that the suspended solids standard would suffice and that an iron standard was superfluous.

Indiana has not experienced any conflicts between coal mine effluent standards and water quality standards. Although Indiana does have total dissolved solids water quality standards for potable water supplies and industrial water supplies, conflicts have so far been avoided because coal mining activities are confined to the extreme southwestern corner of the state, a lightly populated area that does not contain any surface water treatment plants or industrial water users requiring water with low total dissolved solids values.

KENTUCKY

Kentucky's coalfields underlie 31 counties in the eastern part of the state and 14 counties in the western part comprising a total of 16,670 square miles. Kentucky's demonstrated coal reserves as of January 1, 1974 were 25,540.6 million tons almost equally divided between the eastern and western deposits.

There are more mines in Kentucky (2,401 in 1975) than in any other state. Nearly one-third of all U. S. mines are in Kentucky. Coal production reached 143,613,000 tons in 1975 making Kentucky the nation's number one coal producer. Average daily employment in coal mining activities in 1975 amounted to more than 36,000 (Appendix B).

Table KY-1

Number and Production of Bituminous Coal Mines in 1975 (thousands of tons)

	No. of Mines	Quantity
Underground	896	65,632
Strip	493	51,678
Auger	102	1,822
Strip-auger	910	24,481
Total	2,401	143,613

Adapted from U. S. Bureau of Mines, Minerals Yearbook, 1975

Of the 2,401 active mines in 1975, 1,927 produced less than 50,000 tons annually (Table KY-2).

Table KY-2

Size of Mines 1975

	No. of Mines	Quantity
500,000 tons and over	56	66,952
200,000 - 499,999	64	19,053
100,000 - 199,999	112	15,382
50,000 - 99,999	242	16,505
49,999 and under	1,927	25,722

Although composition of coal varies from seam to seam and place to place within a state, the following is a description

of typical Kentucky coal: The moisture content of eastern Kentucky coal ranges from 2.1 - 4.0 percent; ash content ranges from 3.5 - 10.9 percent; sulphur from 0.6 - 3.3 percent and heat values vary from 12,620 Btu per pound to 14,130 Btu per pound. The moisture content of western Kentucky coal varies from 5.0 - 9.9 percent; ash ranges between 5.8 and 10.5 percent; sulphur from 2.4 - 3.3 percent and heat values range between 11,990 Btu per pound and 12,940 Btu per pound. (For a comparison with the other states, see Appendix A.) 3/

The Department of Natural Resources and Environmental Protection, Bureau of Environmental Protection administers programs designed to prevent new and/or abate existing water pollution (Kentucky Revised Statutes, Chapter 224, Environmental Protection, Water Pollution Control). Authority for promulgation and enforcement of water quality rules and regulations with respect to coal mining is shared by the Division of Water Quality (coal preparation plants) and the Bureau of Surface Mining Reclamation and Enforcement (all mines). Kentucky does not have authority to administer the NPDES program although the Division of Water Quality is working toward achieving such authority.

Rules and regulations are promulgated by the Department of Natural Resources and Environmental Protection which seeks advice from a Water Quality Steering Committee whose members serve at the pleasure of the Secretary of said Department. Members represent agriculture, environment, industry (coal and chemicals), the Department and the Attorney General. Rules promulgated by the Department are sent to the Legislative Research Commission for review of legal and political issues and to the Environmental Quality Commission, a seven member environmental advisory group appointed by the governor. A public hearing on the proposed rules may be held at the option of the Department. Revised rules are then filed with the Legislative Research Commission at which point they are considered to be final.

Effluent Standards

Section 224.034(4) of Kentucky's Environmental Protection Act prohibits the Department from imposing any effluent limitation which is more stringent than the federal standard (Table 1).

Water Quality Standards

The Department of Natural Resources and Environmental Protection is in the process of promulgating new water quality standards which should go to public hearings within the next 30 days. The proposed regulations with respect to coal mining are:

Iron 1.0 mg/l except at low flow when the standard will be 3.5 mg/l provided no "irretrievable damage to aquatic life occurs.

Total dissolved solids - Total dissolved solids shall not be changed to the extent that aquatic life will be damaged.

Manganese - .2 mg/l where water is used for irrigation

The following revisions to definitions will also have an impact on coal mining:

Ephemeral stream - One which only exists when it rains. This category is excluded from the "waters of the Commonwealth of Kentucky" and is therefore not subject to water pollution rules and regulations.

OHIO

The coal producing area of Ohio covers 12,340 square miles. As of January 1, 1974, Ohio had demonstrated coal reserves of 21,077,200 tons. [1] Ohio has a large number of strip mines which produced more than half of the 46,770,000 tons of coal mined in Ohio in 1975 (Table OH-1). Average daily employment in Ohio coal mines in 1975 was 3,040 (Appendix B).

Table OH-1
Number and Production of Bituminous Coal Mines in 1975
(thousands of tons)

	No. of Mines	Quantity
Underground	33	15,455
Strip	267	24,908
Auger	25	495
Strip-auger	23	5,912
Total	348	46,770

Adapted from U. S. Bureau of Mines, Minerals Yearbook, 1975

Most of Ohio's mines produce less than 50,000 tons of coal annually (Table OH-2).

Table OH-2
Size of Mines 1975

	No. of Mines	Quantity
500,000 tons and over	25	24,126
200,000 - 499,999	28	9,126
100,000 - 199,999	32	4,639
50,000 - 99,999	67	4,983
49,999 and under	196	3,896

Adapted from U. S. Bureau of Mines, Minerals Yearbook, 1975

Although composition of coal varies from seam to seam and from place to place across the state, typical values of Ohio coal are: moisture content varies from 3.3 - 8.4 percent; ash ranges from 6.6 - 12.3 percent; sulphur, 1.5 - 5.0 percent and heat values range from 11,800 Btu/pound to 13,158 Btu/lb. (For a comparison with other states, see Appendix A.) [3]

The Ohio Environmental Protection Agency has been given authority to issue permits under the NPDES system (Ohio Revised Code Annotated, Title 61, Chapter 6111.01 et seq., Water Pollution Control). The Ohio EPA's Division of Water Quality Standards promulgates rules and regulations which are enforced by the Division of Industrial Wastewater (for coal mines) within the Office of Wastewater and Pollution Control.

Under a new law passed by the Ohio legislature, any new rules and regulations promulgated by Ohio EPA will be subject to legislative approval.

New water quality standards were promulgated by Ohio EPA in 1977 but were rejected by the U. S. Environmental Protection Agency. In addition, the Ohio Chapter of the Sierra Club has brought a suit against Ohio EPA seeking to relieve the agency of its NPDES authority on the grounds that the agency is not in compliance with the 1972 Federal Water Pollution Control Act Amendments. As a result of these two actions, there is some confusion within the Division of Industrial Wastewater.

There are no advisory groups, task forces, ad hoc committees, or commissions working with the Ohio EPA on water pollution control regulations. Ohio coal mine operators gain input to the regulatory process through public hearings in which they have actively participated.

Effluent Standards

Ohio EPA is prohibited by state law from imposing effluent standards which are more stringent than federal effluent standards (Table 1).

Water Quality Standards

Water quality standards do not apply to dissolved iron, dissolved solids, dissolved manganese and pH when the standards are violated as a result of discharges from mines which were abandoned prior to October 1, 1974. More than 50 streams have been classified as "Mine Drainage Water."

Water quality standards pertinent to coal mining in waters

other than "Mine Drainage Waters" are:

Total dissolved solids - May exceed one but not both of the following:

(1) 1500 mg/l (equivalent 25°C specific conductance value is 2400 micromhos/cm) or

(2) 150 mg/l attributable to human activities (equivalent 25°c specific conductance value is 240 micromhos/cm)

Total dissolved solids - for waters used as public water supplies, total dissolved solids may exceed one but not both of the following:

(1) 500 mg/l (equivalent 25°c specific conductance value is 750 micromhos/cm) or

(2) 150 mg/l attributable to human activities (equivalent 25°C specific conductance value is 240 micromhos/cm)

Iron - 1.00 mg/l

0.3 mg/l dissolved for waters designated as public water supplies

Chlorides - 250 mg/l for public water supplies

Sulphates - 250 mg/l for public water supplies

Manganese - 0.050 mg/l for public water supplies

Water quality criteria for public water supplies are measured at the point of intake. The state's standards provide for a mixing zone and for exemptions from water quality standards whenever the flow falls below the annual minimum seven day flow that has a recurrance period of once in 10 years. Best management practices are to be observed during any exception periods.

Ohio has not experienced a conflict between mine discharges and water quality standards in streams classified as public water supplies. Ohio coal operators suspect that conflicts have been avoided thus far because most coal mines are located in rural areas where water supplies are obtained from wells. If such a problem was to present itself, Ohio EPA would resolve

it in one of the following ways:

(a) A permit would not be issued

(b) the mine effluent would be diverted to another watershed where water quality standards would not be violated

PENNSYLVANIA

Pennsylvania is situated at the northern end of the Appalachian Coal Basin. About one-third of the state is underlain with coal bearing rocks. The Main Bituminous Field is located in the southwestern 17 counties. In 1975, Pennsylvania had 835 active coal mines which produced 84,137,000 tons of coal.[1/] Average daily employment in the same year was about 30,000. The value of Pennsylvania's coal production in 1972 was $694.3 million.[2/] About two-thirds of all Pennsylvania mines are strip mines although slightly more than half of the state's coal production is from deep mines (Table PA-1). Pennsylvania's 1975 demonstrated coal reserves were 31,000.6 million tons (Appendix B).

Table PA-1

Number and Production of Bituminous Coal Mines in 1975 (thousands of tons)

	No. of Mines	Quantity
Underground	132	44,631
Strip	661	39,105
Auger	39	354
Strip-auger	3	48
Total	835	84,137

Adapted from U.S. Bureau of Mines, Minerals Yearbook, 1975

In 1975, the state had 539 mines producing less than 50,000 tons annually. Slightly less than half of Pennsylvania's total coal production came from 41 mines (Table PA-2).

Table PA-2

Size of Mines 1975

	No. of Mines	Quantity
500,000 tons and over	41	36,665
200,000 - 499,999	59	18,903
100,000 - 199,999	81	11,382
50,000 - 99,999	115	8,172
49,999 and under	539	9,016

Adapted from U.S. Bureau of Mines, Minerals Yearbook, 1975.

While the composition of coal will vary from seam to seam and from place to place in the state, the following are typical values of Pennsylvania coal: moisture content ranges from 1.0 - 6.9 percent; ash content varies from 4.1 - 17.7 percent; sulphur ranges from 0.5 - 4.3 percent and heat values vary between 12,100 Btu/pound and 14,700 Btu/pound. 3/

Water quality in about 2,300 miles of Pennsylvania streams has been affected by discharges from coal mines for over 150 years. A permit to open, reopen or continue coal mining in both deep and strip mines has been required since 1966.

Pennsylvania's Clean Streams Law (PL1987 as amended) provides for a Department of Environmental Resources which administers rules and regulations promulgated by the Environmental Quality Board, a 21 member board selected by the Governor and the majority leader of the Pennsylvania Senate. One-third of the board members are legislators. Adjudicatory duties are carried out by an Environmental Hearing Board. The Bureau of Water Quality Management, in the Department of Environmental Resources, administers the NPDES program.

In 1977, the Department of Environmental Resources formed an Air and Water Quality Technical Advisory Committee composed of 15 members who serve at the pleasure of the Secretary and who represent conservation, consulting, education, government and industry. The Associate Deputy Secretary for Technical Programs is an ex-officio member of the Committee. At the present time, Dr. Gerald Barthauer, Vice President for Environmental Affairs, Consolidated Coal Company, is a member of the Committee. The Air and Water Quality Technical Advisory Committee was established as a result of concerns expressed by the Chamber of Commerce over the economic impacts of regulations. The purpose of the Committee is to advise the Department of Environmental Resources on technical, economic or social impacts of existing, new, or proposed revisions to air and water pollution

control regulations and to review and comment on the applicability and/or feasibility of new control techniques or technologies.

Effluent Standards

Specific stream criteria may be applied as discharge limits if the controlled substance is toxic and/or bioaccumulative, a waste load allocation makes it necessary, or where there is little or no dilution of the effluent by the receiving waters.

In addition to the effluent limitations imposed by federal standards, numerical effluent limitations for Mine Drainage in Pennsylvania is found at Title 25, Rules and Regulations, Part I, Department of Environmental Resources, Subpart C, Article II, Chapter 99 (see Table 1).

An exception may be granted to the effluent limitations if the operator has demonstrated that the exception would not cause water pollution. The Department may also impose more stringent limitations (for aluminum, sulphates, manganese, etc.) if necessary to protect water quality.

Water Quality Standards

Pennsylvania defines water quality standards as the combination of water uses to be protected and the water quality criteria necessary to protect those uses. Pennsylvania's water quality standards are designed to protect beneficial water uses during critical low stream flow periods and the state's water quality criteria are based on a specified low stream flow condition, normally the actual or estimated lowest seven consecutive day average flow that occurs once in ten years. When a stream falls below that condition, the general rather than the specific water quality criteria apply.

Water quality criteria relevant to bituminous coal mining in Pennsylvania are as follows:

Chloride - Not more than 150 mg/l

Iron - Not to exceed 1.5 mg/l as total iron, not to exceed 0.3 mg/l as dissolved iron

Manganese - Not to exceed 1.0 mg/l as total manganese

pH - 6.0 - 9.0
Sulphate - Not to exceed 250 mg/l
Total dissolved solids - Not more than 500 mg/l as a monthly average; not more than 750 mg/l at any time.

A study of economic impacts of total dissolved solids in the Monongahela River Basin [4/] revealed that despite improvements made in reducing alkalinity, pH and iron due to better treatment of active mine discharges, high concentrations of sulphates, hardness and dissolved solids persist. For flows equal to and less than 4900 cfs, values for sulphates, hardness and dissolved solids are increasing in time at the ORSANCO monitor in Charleroi, Pennsylvania.

Bureau of Water Quality Management personnel estimate that at least 75 percent of all coal mines in Pennsylvania are out of compliance with the state's total dissolved solid water quality standard; however, the Department has hesitated to enforce compliance for two major reasons:

(a) The impact of high total dissolved solids is primarily economic rather than health related in that the cost of using high total dissolved solids water is greater than using low total dissolved solids water.
(b) Procedures currently available to combat high total dissolved solids might cause an adverse economic impact on the coal mining industry.

The Pennsylvania Department of Environmental Resources is currently studying the complexities of the total dissolved solids issue and has outlined the following alternatives:

(a) Enforce the present total dissolved solids limit.
(b) Identify streams as high quality and anti-degradation areas and require a demonstration of socio-economic need before new sources of pollution are permitted.

(c) Allow limited degradation based on criteria currently not identified.

(d) Permit discharges as least as good as existing water quality if the stream criteria are already exceeded.

The Department of Environmental Resources believes that "Best available technology economically feasible" will not control sulphates and other dissolved solids from coal mining operations. The Department believes that any legal test of their present standards would sustain the state's water quality regulations based on an enforcement action against a power company that was disposing of fly ash in a deep mine and causing violations of the state's water quality standards.

WEST VIRGINIA

Coal occurs in 53 of West Virginia's 55 counties and has always been an important part of the West Virginia economy. In 1975, West Virginia produced 109,283,000 tons of coal.[1] The average daily employment in coal mines in 1975 amounted to nearly 55,000 (Appendix B).

West Virginia has more than 1,000 mines; the majority of which are deep mines although the state also has a large number of small strip mines (Tables WV-1 and WV-2).

Table WV-1

Number and Production of Bituminous Coal Mines in 1975 (thousands of tons)

	No. of Mines	Quantity
Underground	703	88,357
Strip	323	16,846
Auger	3	46
Strip-auger	43	4,034
Total	1,072	109,283

Adapted from U.S. Bureau of Mines, Minerals Yearbook, 1975.

Table WV-2

Size of Mines 1975

	No. of Mines	Quantity
500,000 tons and over	45	40,074
200,000 - 499,999	91	27,798
100,000 - 199,999	122	16,849
50,000 - 99,999	188	13,409
49,999 and under	626	11,152

Adapted from U.S. Bureau of Mines, Minerals Yearbook, 1975.

Although composition of coal varies from seam to seam and among different localities in the state, the following is a description of typical West Virginia coal: moisture content ranges from 1.5 - 4.2 percent; ash varies from 6.0 to 12.0 percent; sulphur ranges from 1.5 - 3.0 percent and heat values generally fall between 11,000 Btu/lb. and 15,000 Btu/lb. (See Appendix A for comparison with other states.)[3]

West Virginia is not delegated to issue NPDES permits. The State Water Resources Board and the Chief of the Division of Water Resources in the Department of Natural Resources ((Chapter 20, Article 5A, West Virginia Code as amended) share the authority to "prevent, control, eliminate or reduce water pollution." The Mine Drainage Unit reviews NPDES permits and issues state water pollution control permits for underground mines. The Division of Reclamation issues water pollution control permits for strip mines and has been delegated authority to coordinate provisions of the Federal Reclamation Act within the state.

The State Water Resources Board is composed of five members appointed by the governor with the advice and consent of the West Virginia Senate. Members must be "knowledgeable in the husbandry of the state's water resources" with one member experienced in industrial pollution control. There are currently two vacancies on the Water Resources Board. The present Board Chairman who is a Professor Emeritus of the West Virginia School of Mines, has enormous influence on Board decisions by virtue of his knowledge of coal mining. The Water Resources Board promulgates regulations and may hear appeals for the vacation or modification of actions taken by the Chief of the Division of Water Resources.

Effluent Standards

West Virginia's effluent standards are the same as the federal effluent limitations for coal mine drainage. (Table 1)

Water Quality Criteria

Water quality standards pertinent to coal mining are:

Chlorides - 100 mg/l

West Virginia's water quality standards include water quality criteria, water uses and a section on acid mine drainage. Mixing zones are determined on a case by case basis.

The state has no water quality standards for iron or sulphates. At one time the state had a sulphate standard of 500 mg/l but it was removed at the request of the coal industry.

Gas well drilling produces large quantities of chlorides but enforcement of the chloride standard has been difficult due to the difficulty of tracing the source of a brine spill and the small size of the staff employed to enforce water quality regulations.

WYOMING

Coal bearing rocks occur beneath about 40,000 square miles of the State of Wyoming. In 1975, the state produced 23,805,000 tons [1/] of coal making it the eighth largest coal producing state in the nation. Wyoming's demonstrated coal reserves amounted to 53,336.1 million tons as of January 1, 1974. The average number of men working daily in Wyoming coal mines in 1975 was 1,630 (Appendix B).

Wyoming has a small number of large strip mines. In 1975, there were only five active deep mines which produced 436,000 tons of coal (Table WY-1).

Table WY-1

Number and Production of Bituminous Coal Mines in 1975 (thousands of tons)

	No. of Mines	Quantity
Underground	5	436
Strip	15	23,369
Total	20	23,805

Adapted from U.S. Bureau of Mines, Minerals Yearbook, 1975

More than 22 million tons of coal was produced by 11 large strip mines during 1975; while only 22,000 tons was produced by mines with outputs of 49,999 tons or less. (Table WY-2)

Table WY-2

Size of Mines 1975

	No. of Mines	Quantity
500,000 and over	11	22,679
200,000 - 499,999	2	669
100,000 - 199,999	2	285
50,000 - 99,999	2	150
49,999 and under	3	22

Although the composition of coal will vary between seams and between localities in a state, the following is a description of typical Wyoming coal:

The moisture content of Wyoming coal varies across the state: 10.0 - 13.0 percent (south); 20.0 percent (Jim Bridger mine); 21.0 - 30.0 percent (west and northwest). Ash content ranges from 4.0 - 10.0 percent; while sulphur varies between 0.5 and 0.9 percent except for Wasatch coals in the Green River coal region which averages 7.0 percent but which is presently not being mined. Typical heat values for Wyoming coal are 10,000 - 11,500 Btu/lb. (south); 9,350 Btu/lb. (Jim Bridger mine); 9,800 Btu/lb. (west); 7,550 - 9,300 Btu/lb. (northeast). 3/

Wyoming received the authority to issue NPDES permits in 1975. Statutory authority for Wyoming's water quality rules and regulations is found at W. S. Sec. 35-502 et seq., "Wyoming Environmental Quality Act" as amended. Authority to promulgate rules and regulations to control water pollution is vested in the Environmental Quality Council, a seven member board appointed by the governor with the advice and consent of the Senate. At least one member of the Council must represent the minerals industry. The Council has the power to hear and act upon appeals from anyone affected by decisions or actions by the Wyoming Department of Environmental Quality.

The Department of Environmental Quality is divided into three divisions: Water Quality, Air Quality and Land Quality. Each Division has an advisory board which recommends policy to the Environmental Quality Council and the Administrator. The Water Quality Board consists of five members appointed by the governor. One member represents political subdivisions, one member represents industry, one member represents agriculture, and two members represent the general public.

Enforcement of Water Quality Rules and Regulations is carried out by the Water Quality Division through the NPDES permit system.

Effluent Standards

Wyoming's effluent standards may be more stringent

than the federal standards (Table 1). Effluent limitations on chlorides (2000 mg/l), sulphates (3000 mg/l) and total dissolved solids (5000 mg/l) were promulgated primarily to control discharges of brine from oil and gas wells. The limitations are being met is most cases by reinjection of the brine or containment in evaporation ponds.

Water Quality Standards

Wyoming's water quality standards include stream classifications, use classifications and water quality criteria. Compliance is determined after allowing reasonable time for mixing. The size of mizing zones is determined on a case by case basis. Wyoming's water quality criteria pertinent to coal mining is summarized as follows:

Salinity: Wyoming recognizes that high salinity (total dissolved solids) is an important water quality parameter which may cause adverse economic and physical impact.

Wyoming is a member of the Colorado River Basin Salinity Control Forum and has adopted a salinity control program for that part of the Colorado River Basin occurring in Wyoming (Green River drainage) which affects about one-sixth of the state. The control program states that water resource management practices will be used that do not increase salinity levels in the Colorado River above 1972 levels. Additional salinity loading could have the effect of restricting Wyoming's ability to develop Colorado River Compact waters.

High salt loadings on the Green River are the result of two reservoirs constructed on naturally occurring salt deposits. Non-point source pollution (range runoff and grazing activities) on the Green River also contribute to high total dissolved solids levels. The state believes that further study is required to determine the economic and technical feasibility of controlling salinity through the 208 planning process.

Salinity from coal mining operations is not considered a problem in Wyoming. The state is semi-arid; there is little dewatering from coal mines. Where treatment is necessary, the effluent is discharged into evaporation ponds. At present, there are no discharges from coal mines into the Green River or its tributaries. Because coal mines in Wyoming are "alkaline" any water that is discharged is relatively free from iron and manganese and is considered to be of good quality.

FINDINGS

All of the states surveyed except West Virginia have a total dissolved solids water quality standard in one form or another. Pennsylvania's water quality standard for total dissolved solids is more stringent that Illinois' standard. The other states' water quality standards for total dissolved solids range from a mere acknowledgement that total dissolved solids is an important water quality parameter (Wyoming) with no numeric limitations to specific limitations designed primarily to protect public water supplies (Indiana, Colorado, Ohio) and industrial water supplies (Indiana) (Table 1).

All of the states surveyed (including West Virginia) believe that the issue is primarily an economic issue; that is, it is less costly to use water which is low in total dissolved solids than to use water which is high in total dissolved solids. Most of the states believe that some standard for total dissolved solids is necessary to assure potable water supplies.

While most states have not experienced problems resulting from industrial water users having to bear the financial burden of treating water high in total dissolved solids because of geographic segregation of mines and industry, most states believe the issue to be a potential problem.

All of the states surveyed believe that the treatment technology involving use of retention ponds, sedimentation, neutralization, aeration and removal of suspended solids in addition to improved mining and reclamation practices are generally effective in reducing total iron, manganese, acidity and total suspended solids from active mine sites. Abandoned mines continue to be the major sources of water pollution in Pennsylvania, Ohio, Kentucky and West Virginia.

Only two states' legislatures (Ohio and Kentucky) have passed laws which prevent their water pollution control agencies from imposing more stringent effluent standards than federal

limitations to protect water quality.

No other state has a task force, committee or commission comparable to the Mine Related Pollution Task Force. While some other states (Indiana, Kentucky, Pennsylvania, Wyoming) have advisory groups, the membership and scope of interest is in all cases broader.

REFERENCES

1/ U. S. Department of the Interior. 1975. Minerals Yearbook (Vol. I). U. S. Bureau of Mines, Washington, D. C.

2/ U. S. Department of Commerce. 1972. Census of Mineral Industries. U. S. Bureau of Census, Washington, D. C.

3/ Mining Information Services. 1976. Keystone Coal Industry Manual. McGraw Hill, New York.

4/ Schoener, K. E. 1976. Impact of Four Energy Futures on Total Dissolved Solids. (Review Draft). Division of Water Quality, Department of Environmental Resources, Harrisburg.

Appendix A

Comparison of Typical Coal Values for Selected States

State	% Moisture as received	% Ash	% Sulphur	Heat Values as received	Comments
Colorado	1.0-20.0	2.1-15.0	0.2-1.1	11,370 Btu/lb avg.	99% contains less than 1.0% sulphur
Illinois					
Northwest	18.0-21.0	5.0-13.0	3.0-5.0	11,000-11,600 Btu/lb	
Southeast	4.0- 7.0			13,700-15,000 Btu/lb	
Indiana	10.0-15.5	6.3-12.2	1.1-3.3	10,900-11,590 Btu/lb	
Kentucky					
Eastern	2.1-4.0	3.5-10.9	0.6-3.3	12,620-14,130 Btu/lb	
Western	5.0-9.9	5.8-10.5	2.4-3.3	11,990-12,940 Btu/lb	
Ohio	3.3-8.4	6.6-12.3	1.5-5.0	11,800-13,158 Btu/lb	
Pennsylvania	1.0-6.9	4.1-17.7	0.5-4.3	12,100-14,700 Btu/lb	
West Virginia	1.5-4.2	6.0-12.0	1.5-3.0	11,000-15,000 Btu/lb	
Wyoming					
South	10.0-13.0	4.0-10.0	0.5-0.9	10,000-11,500 Btu/lb	7% sulphur in Wasatch coals in Green River Coal Region - not mined at present.
Jim Bridger	20.0			9,3500 Btu/lb	
West & Northeast	21.0-30.0			9,800 Btu/lb (west) 7,550-9,300 (northeast	

Adapted from 1976 Keystone Coal Industry Manual

Appendix B

Comparison of Number of Bituminous Coal Mines, Production, Value and Average Daily Employment for Selected States, 1975

State	No. of Active Mines	Total Production (000's)	Average Value per ton (a)	Average Daily Employment
Colorado	33	8,219	$16.53	1,840
Illinois	58	59,537	$14.64	12,850
Indiana	62	25,124	$11.15	3,040
Kentucky (eastern)	2,219	87,257	$20.79	25,450
(western)	182	56,357	$12.16	10,620
Ohio	348	46,770	$16.40	13,430
Pennsylvania	835	84,137	$25.09	29,960
West Virginia	1,072	109,283	$29.35	54,210
Wyoming	20	23,804	$ 6.74	1,630

(a) Value received or charged for coal fob mine including value for coal not sold estimated by producer.

Adapted from U. S. Bureau of Mines, Minerals Yearbook, 1975.

Appendix C

Demonstrated Coal Reserves Total Underground & Surface

(millions of tons)

State	Reserves (1974)	Production (1975) [a]
Colorado	14,869.2	8,219
Illinois	65,664.8	59,537
Indiana	10,622.6	25,124
Kentucky (eastern)	12,916.7	87,257
(western)	12,623.9	56,357
Ohio	21,077.2	46,770
Pennsylvania	31,000.6	84,137
Wyoming	53,336.1	23,804

(a) Based on rail carloadings and river shipments supplemented by direct reports and estimates for coal shipped by truck.

Adapted from U. S. Bureau of Mines, Minerals Yearbook, 1975.

Appendix D

Agency Designated to Coordinate

Surface Mining Control and Reclamation Act of 1977

Colorado
Colorado Division of Mines, Department of Natural Resources, 1845 Sherman Street, Denver, CO 80203

Indiana
Indiana Division of Reclamation, Department of Natural Resources, State Office Building, Indianapolis, Indiana 46204

Illinois
Illinois Division of Mines and Minerals, State Office Building, Springfield, Illinois 62701

Kentucky
Kentucky Department of Natural Resources and Environmental Protection, Capital Plaza, Frankfort, Kentucky 40601

Ohio
Ohio Department of Natural Resources, Division of Reclamation, Fountain Square, Columbus, Ohio 43216

Pennsylvania
Surface Mine Reclamation, Department of Environmental Resources, 200 W. Third St., Harrisburg, Pennsylvania 17120.

West Virginia
Division of Reclamation, West Virginia Department of Natural Resources, Charleston, West Virginia 25305

Wyoming
Land Quality Division, Department of Environmental Quality, State Office Building, Cheyenne, Wyoming 82002